

REMARKS

Claims 1-9, 18-23, 29, 30 and 33 have been withdrawn. Claims 10-17, 24-28, 31 and 32 are pending, claims 10-12, 16, 24, 26, and 31 have been amended, and claims 17, 25 and 32 have been canceled. Entry of the amendments and reconsideration of the application are requested. Basis for the amendments is at specification page 5, lines 6-8, page 6, line 12-page 7, line 4, canceled claim 25 and Figures 2-4.

The present claims are directed to improving coating die slot uniformity. As stated at specification, page 7, lines 27-31, even an appropriately designed die coater can have an inconsistent slot profile, i.e., variations in slot height along the length of the slot characterized as a “smile” profile or “frown” profile (see Figs 3A and 3B) measured by total indicated runout (TIR) of slot height. The inventor has discovered means for alleviating such variations and making the profile of the die slot flatter.

The rejection of claim 26 under 35 USC § 112, second paragraph, as indefinite has been avoided by the amendment to claim 24 which provides antecedent basis for forward and rearward fasteners in claim 26.

Claims 10-12, 15, 24-25 and 28 have been rejected under 35 USC § 102(b) as being anticipated by Takahashi U.S. Patent 4,984,533. This rejection has been avoided by the amendments.

The following differences exist between the amended claims and Takahashi:

1. The amended claims require that the fasteners extend through the first die block and into the second die block; whereas, the screws in Takahashi, only extend into one of the two die blocks (see Fig. 2). The contentions at office action page 3, lines 9-12 (that Takahashi’s fasteners provide a compression force between first and second die blocks) and at page 4, lines 6-8 (that Takahashi teaches offset bracket 8 places compression force between the first die block and second die block) are not accurate. Since Takahashi’s screws 9a, 10a and 11a only extend into one die half, they can not exert any force between the two die halves 3 and 4. They serve to apply forces between Takahashi’s thick members 8 and die half 4 as is made clear by Takahashi column 3 and Fig. 3.

2. The amended claims require that some fasteners are located behind the internal manifold, as forward and rearward fasteners (i.e., pairs of fasteners); whereas, although Takahashi’s fasteners

11a are behind liquid reservoir 6 in Takahashi Figure 2, he does not disclose any forward fasteners behind the liquid reservoir; i.e., no fastener pairs behind the liquid reservoir. Takahashi states (column 2, lines 18-21, column 2, line 65-column 3, line 4, column 4, lines 46-49 and claim 1) and shows (Figs 1-3) that he requires acting portion 9 of his thick member 8 to be near the liquid discharge end of his die; so that, screw 9a could not be behind the internal manifold. Screw 10a at the fulcrum or central portion of his thick member 8 is shown to be over the liquid reservoir 6, not behind it.

3. Takahashi does not disclose the torque differential of greater than about 3% (5%) between at least two (forward and nearest rearward) fasteners required in claims 10, 28 (and claim 15).

4. Takahashi does not disclose the limitation of claim 11 to the distances O_F and O_B between the forward fastener and the internal manifold and the rearward fastener and the die back surface respectively. Office action page 4, lines 8-10 say that Takahashi shows the relationship of the forward row and rearward fasteners to a desired area of the internal manifold and the die back surface. As claims 10 and 11 have been amended, this is not the case, since claim 10 now requires that the fasteners specified in part (c) of claim 10 are located behind the internal manifold, the fasteners to which the limitations of amended claim 11 apply are now the fasteners of part (c), and Takahashi discloses no pairs of fasteners both of which are located behind his liquid reservoir 6. Given that requirement for the fasteners, the distances O_F and O_B specified in claim 11 are those shown in Fig. 2 of the present application and do not exist in Takahashi.

In light of the above listed differences, the amended claims are novel over Takahashi.

Claims 13, 14, 16, 17, 26, 27, 31 and 32 have been rejected under 35 USC § 103(a) as obvious over Takahashi. This rejection has been avoided by the amendments and is moot as to canceled claims 17 and 32.

There are substantial differences between the claims as amended and Takahashi. As to all the rejected claims difference no. 1 above applies. As to claims 13, 14, 16, 17, 26 and 27, difference no. 2 above applies, and as to claims 13, 14, 16 and 17 difference no. 3 (failure to disclose torque differential of greater than about 3% between forward and nearest rearward fasteners) applies. In example 5 of the present specification, it is shown that, by means of the inventive torque adjustment to pairs of forward and rearward bolts fastening the first and second

die blocks together, the best (flattest) die slot profile was achieved, as evidenced by the topmost line plotted on Fig. 6. Some bolt pairs in Example 5 have greater than 3% and greater than 5% differential in torque (e.g., 20 ft-lbs. vs. 34 ft-lbs.)

In addition:

As to claims 16 and 31, Takashi does not disclose an overhang O_H less than about 119 mm or the ratio of $(\text{overhang}/\text{thickness})^3$ specified in claims 16 and 31 as less than about 9. As shown in Example 1 of the present application, inventive dies characterized by overhang no more than 4.7 inches (119 mm) and $(\text{overhang}/\text{thickness})^3$ ratio <9 were found experimentally to yield benefits in die slot height uniformity. As shown in Table 1 of the present specification by total indicated runout (TIR) of the die slot height, TIR at overhang less than 119 mm and $(\text{overhang}/\text{thickness})^3$ ratio <9 was 30 microinches or less, as compared to 90 microinches or greater with overhang greater than 119 mm and $(\text{overhang}/\text{thickness})^3$ above 9. Although there is an overhang in Takahashi's application head, there is no disclosure of a relationship between overhang and any coating criteria, nor is any particular limitation on overhang mentioned.

As to claim 26, Takahashi does not disclose the relationship between torque on the forward fastener to torque on the rearward fastener $T_{\text{front}} = T_{\text{back}} \left[\frac{S_B + O_F - O_B}{S_B - O_F - O_B} \right]$ when using an offset bracket. The use of this mathematical relationship is discussed at specification page 13, in example 4 and the results shown in Fig. 6 as the line plotted for "Brackets, 20 ft-lbs Front Row, 34 ft-lbs rest". The use of this relationship in tightening the fasteners through offset brackets is shown to yield an improved slot height profile over the lower-most profile in Fig. 6 for which no offset brackets or any of the other techniques of the present claims were used.

As to claim 32, Takahashi does not disclose the relationship of $(\text{overhang}/\text{thickness})^3$ divided by modulus of elasticity of the first die block (less than $3.0 \times 10^{-7} \text{ in}^2/\text{lb}$) to die slot height uniformity. Application example 1 shows that die coaters meeting this limitation had a substantially lower TIR than those for which this ratio was higher.

In order to arrive at the inventions of claims 13, 14, 16, 17, 26, and 27 from Takahashi, one would have to modify Takahashi's teaching by:

a. redesigning Takahashi's application head so that the screws were longer and went through one die half and into the other, despite no teaching in the reference to do so;

b. further redesigning Takahashi's application head so that there were forward and rearward fasteners located behind the internal manifold (his liquid reservoir 6) despite that fact that he contains no teaching to place pairs of fasteners in such a location;

c. as to claims 13, 14, and 16, tightening Takahashi's fasteners so that there is at least a 3% differential between forward and rearward fastener torque, without any teaching to do so;

d. as to claim 16, adding the limitations on overhang (no more than 119 mm. overhang and $(\text{overhang}/\text{thickness})^3 < 9$), without any indication in Takahashi that one should do so. Office action page 5, lines 1-7 says that the overhang limitation of claims 16-17 (now combined into claim 16) would be an obvious matter of design choice given Takahashi. To the contrary, specifying the limitations on overhang in claim 16 is not the same as a mere change in size of a component. The limitations on overhang come from the inventor's discovery of the effect of these overhang parameters (amount of overhang and $(\text{overhang}/\text{Top thickness})^3$) on die slot height uniformity. One might change a component size for any number of reasons, but neither Takahashi nor the skill of the art lead one to limit overhang as specified in amended claim 16. Dies made within the scope of amended claim 16 have a benefit (more uniform slot profile) not predicted by the prior art.

e. as to claim 26, tightening the forward and rearward fasteners according to the mathematical

relationship $T_{\text{front}} = T_{\text{back}} \left(\frac{S_B + O_F - O_B}{S_B - O_F - O_B} \right)$ despite the lack of any teaching in Takahashi to do so.

The modifications above show that there are elements of the amended claims missing from Takahashi, and those modifications would be too extensive to be obvious to the person of ordinary skill.

Claims 31 and 32 have been rejected under 35 U.S.C. §103(a) as obvious over Tyrner U.S. Patent 3,241,183. This rejection has been avoided by the amendments to claim 31 and is moot as to canceled claim 32.

Although Tyrner discloses a die with overhang, it does not disclose the limitations on overhang in claim 31. As discussed above, these limitations (no more than 119 mm. overhang, $(\text{overhang}/\text{thickness})^3 < 9$ and $((\text{overhang}/\text{thickness})^3 / \text{modulus of first die block}) < 3.0 \times 10^{-7} \text{ in}^2/\text{lb}$)

have an impact on die slot height uniformity that was discovered by the present inventor as evidenced by Example 1, specification pages 15-16. There is nothing in Tyrner that indicates one should place these limitations on overhang. Tyrner teaches adjusting slot height by means of wedge 28 (column 3, lines 3-28 and Figures 1, 2, and 5). Hindsight would be required in order to add the limitations on overhang in amended claim 31 to Tyrner.

In view of the above discussion, it is respectfully submitted that claims 10-16, 24, 26-28, and 31, as amended, are in condition for allowance. Withdrawal of the rejections under 35 U.S.C. 112, 102, and 103 are requested and a notification of allowability is respectfully solicited. If any issues or questions remain the resolution of which the Examiner feels would be advanced by a conference with Applicants' attorney, she is invited to contact such attorney at the telephone number noted below.

Respectfully submitted,

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Date

By: /Douglas B. Little/

Douglas B. Little, Reg. No.: 28,439

Telephone No.: 651-733-1501

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833